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(54) **Electro-optic cable**

(57) An overhead power cable for the simultaneous transmission of electrical energy and data signals, has one or more layers of electrically conductive wires (1) and inside said layers light conducting fibres (3) individually provided with a mantle of synthetic resin (4) and furthermore surrounded by a common sheath of synthetic resin (2). According to the invention the light conducting fibres (3) are stranded with or around one or more strength members (6) with a strand-length from 5 to 15 times the diameter of the strand. Furthermore the core of fibres and wires is provided with a band of synthetic resin (8) and a seamless metal shield (9) is arranged between the above sheath (2) of synthetic resin and the wire layers (1).

Preferably, the sheath (2) is polyethylene, the band (8) is polystyrene or a fluorine containing resin, and the strength members (6) are polyamide.

Figure 2 shows a termination for such a cable (13). The fibres in cable (13) are spliced inside a fitting (14) with an optic cable (17). Cable (17) passes through an insulator (16) filled, after assembly, with silicone resin (18).

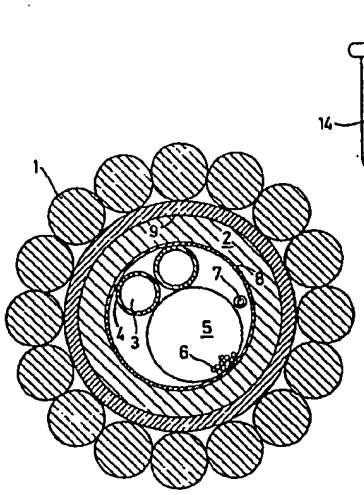

FIG.1

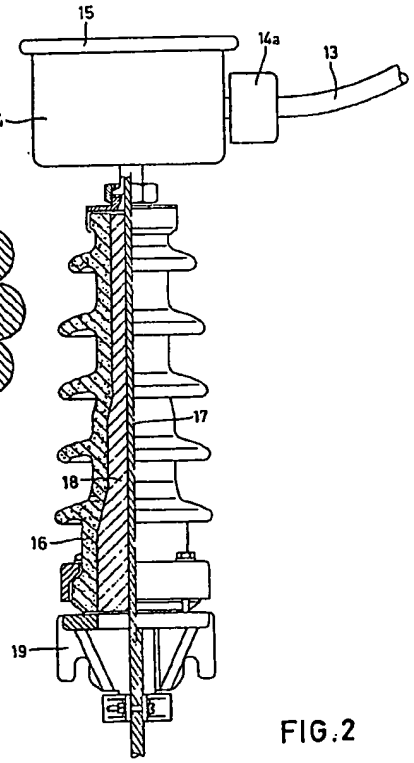

FIG.2

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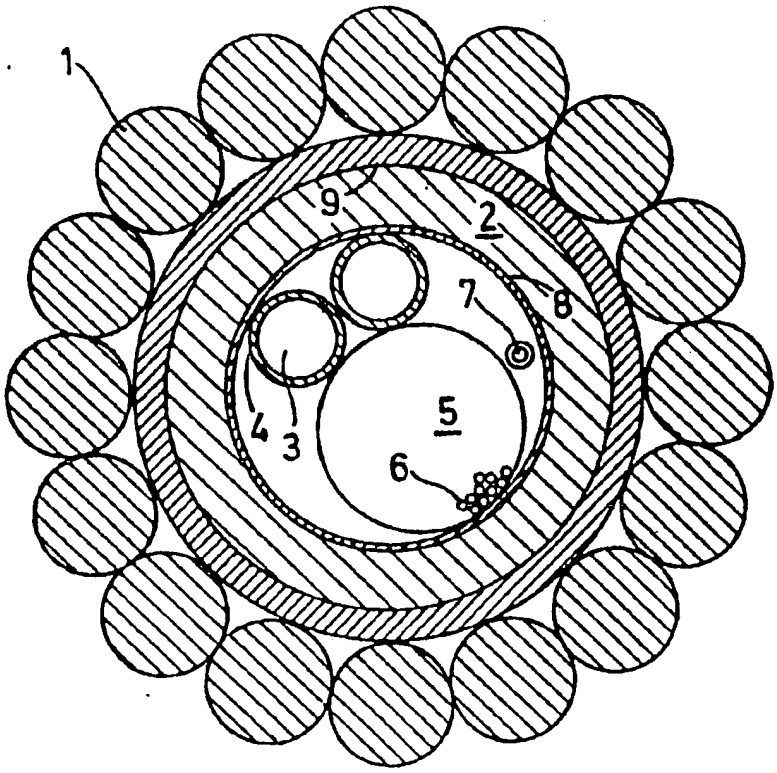

FIG.1

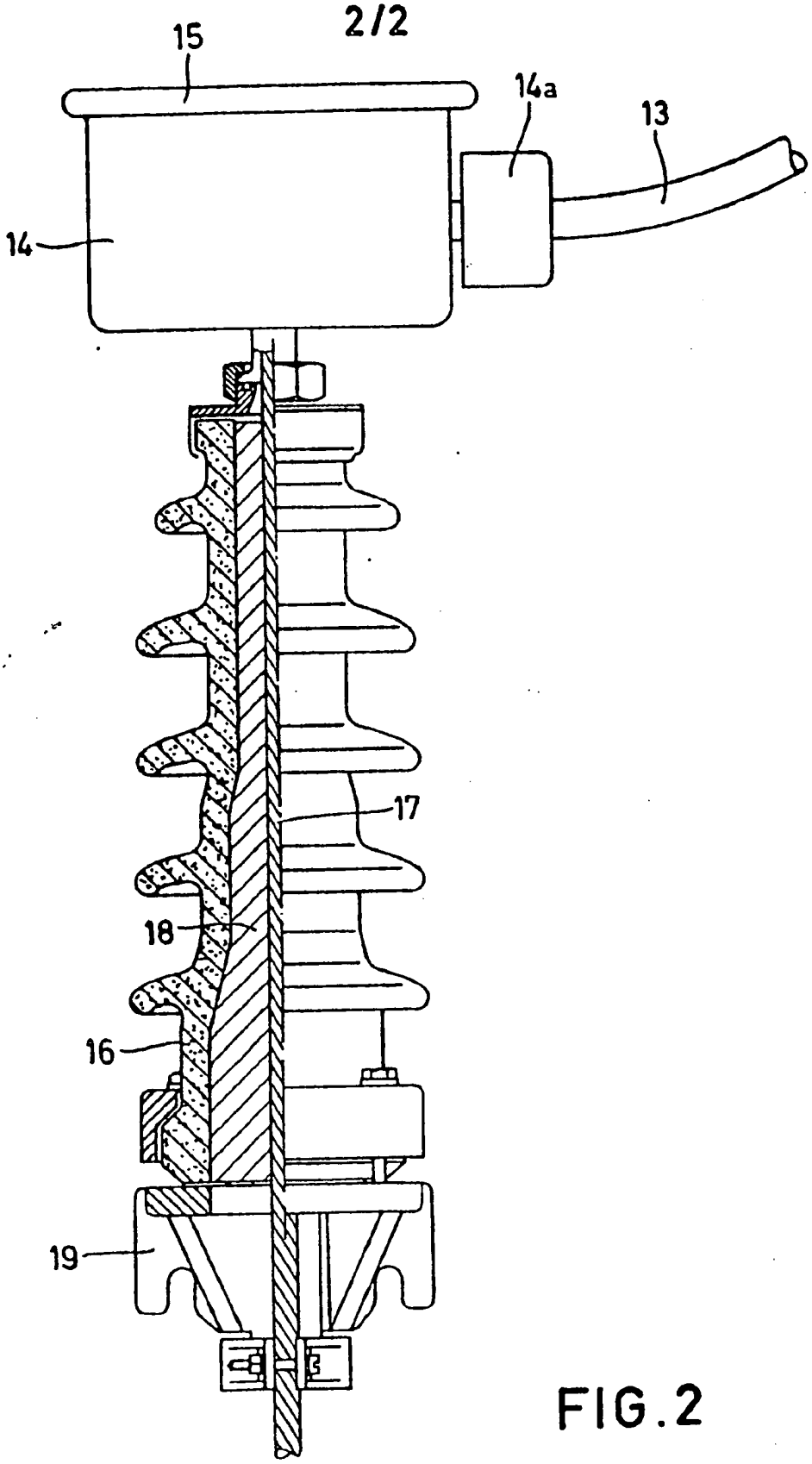

FIG.2

SPECIFICATION

Overhead power cable having light conducting fibres arranged in its interior

The invention relates to an overhead power cable for the simultaneous transmission of electrical energy and data signals, comprising one or more layers of electrically conductive wires and inside said layers light conducting fibres which individually are provided with a mantle 9 synthetic resin and furthermore are surrounded by a common sheath of a synthetic resin.

Such a cable may be used in overhead power systems for the transmission of electrical energy and is particularly suitable as a high voltage cable.

From French Patent Specification 2,239,742 an aerial cable is known having a data transmission system of light conductors (optical fibres) arranged in the interior of a supporting member, in which the light conductors are surrounded by a sheath of synthetic resin on which wires are wound helically and in which the supporting member is formed by a high voltage phase cable.

The above French Patent is based essentially on the idea of using a wire cable comprising light conducting fibres as a high voltage phase cable and it gives an indication that the light conducting fibres must be protected by a sheath of synthetic resin against mechanical load exerted on the cable during manufacture, laying, and operation Suggestions for a practically useful construction of such a cable are not given in said French Patent.

It is an object of the present invention to provide an overhead power cable of the type described in the opening paragraph in which the optical fibres are fully protected against a number of stresses and also against moisture and which is easy and inexpensive to manufacture and use.

According to the invention this object is achieved in that the light conducting fibres are stranded with or around one or more strength members with a strandlength from 5 to 15 times the diameter of the strand, wherein the core comprising the fibres and wires is provided with a band of synthetic resin and wherein a seamless metal sheath is provided between the sheath of synthetic resin and the wire layers.

In a favourable embodiment the theath of synthetic resin surrounding band consists of high-density polyethylene.

The advantages which can be achieved by means of the invention consists in particular in that it has surprisingly been found that with the comparatively simple construction described a safe and sure protection for a long period of time can be achieved of the comparatively sensitive optical fibres. The protection for a long period of time in particular against thermal stresses is furthermore improved by the choice of the material for the synthetic resin sheath and the seamless metal sheath.

The strength members may comprise a bundle of high strength wires such as a bundle of polyamide wires (Trade name Kevlar) if desired in a matrix of a synthetic resin such as an epoxide resin. Another example of a strength member is a bundle of glassfibres in a matrix of a synthetic resin such as polyester.

Embodiments of the invention are shown in the drawing, whereby:

Figure 1 is a cross-sectional view of the cable according to the invention,

Figure 2 is a diagrammatical view of the overhead power cable in combination with a cable fitting.

Figure 1 is a cross-sectional view of an overhead power cable of the type described. In Figure 1 a layer of metal wires 1 is shown which serve for the transmission of high voltage electrical energy and consequently consist preferably of copper or aluminium. They are stranded around a sheath 2 of a synthetic resin obtained by an extrusion process. Inside the sheath 2 of synthetic resin which preferably consists of a high-density polyethylene, light conducting fibres 3 are provided which are each individually surrounded by a mantle 4 of synthetic resin. The light conducting fibres 3 may be arranged loosely within mantle 4, as is shown in the drawing, but they may alternatively have a mantle directly applied over the surface of the fibres. The fibres 3 with their mantles 4 of synthetic resin are stranded with a short strand together with a bundle 5 which consists of high-strength wires 6. It has been found that a strand length between 5 and 15 times the strand-diameter gives the most favourable results for the end in view. The stranded fibres 3 with their mantles 4 of synthetic resin together with the bundle 5 of high-strength wires 6 of synthetic resin form a core 7 of the overhead power cable. Core 7 is surrounded by a band 8 of synthetic resin which serves to prevent adhesion of sheath 2 to the core 7 particularly during manufacture of the cable. Band 8 of synthetic resin thus consists preferably of polystyrene or of a known fluorine-containing synthetic resin. A closed seamless metal sheath 9 is provided for example by means of extrusion, over sheath 2 of synthetic resin and below the layer of wires 1. It preferably consists of the same material as wires 1 and protects the inner construction of the cable quite reliably against moisture. The metal sheath 9 furthermore improves the active conductor cross-section of the cable so that at a given power transmission the diameter of the cable may be reduced due to the presence of said metal sheath 9.

Figure 2 diagrammatically shows the overhead power cable represented in Figure 1 in combination with a cable fitting. The overhead power cable is denoted by 13. It comprises a connection terminal 14a *via* which the energy transmission occurs. The end of the cable 13 projecting *via* the connection terminal 14a is connected to a master fitting 14 in which it is mechanically safely secured. In the interior of the master fitting 14 the light conductor fibres (not shown) comprised in the overhead cable 13 are accessible and are spliced with the subsequent light conductor cable 17. After making the connections the interior of the master fitting 14 is moulded with a moulding resin and sealed in an airtight and watertight manner by the cover 15. The master fitting 14 is supported by a supporting isulator 16 known per se which in turn is connected

to the connection collar 19. The further conducting optical cable 17 extends from the master fitting 14 through the interior of the supporting insulator 16 to the data apparatus not shown in Figure 2. The interior of the supporting insulator 16 is advantageously moulded with a synthetic resin 18 after assembly. A preferred moulding mass is a silicone-containing synthetic resin.

CLAIMS

1. An overhead power cable for the simultaneous transmission of electrical energy and data signals, having one or more layers of electrically conductive wires and inside said layers light conducting fibres which are individually provided with a mantle of synthetic resin and furthermore surrounded by a common sheath of synthetic resin, wherein the light conducting fibres are stranded with or around one or more strength members with a strandlength from 5 to 15 times the diameter of the strand, wherein the core comprising the fibres and wires is provided with a band of synthetic resin and wherein a seamless metal sheath is provided between the sheath of synthetic resin and the wire layers.

2. A overhead power cable as claimed in Claim 1, wherein the sheath of synthetic resin surrounding band consists of high-density polyethylene.

3. An overhead power cable for the simultaneous transmission of electrical energy and data signals substantially as described herein with reference to Figure 1 of the accompanying drawings.

4. The combination of an overhead power cable as claimed in any of Claims 1 to 3 and a cable fitting substantially as described herein with reference to Figure 2 of the accompanying drawings.

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